DOCUMENT RESUME

ED 306 498 CG 021 631

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TITLE Computer Competence for the Applied Gerontologist.
PUB DATE 20 Mar 89
NOTE 25p.; Paper presented at the Annual Meeting of the American Society on Aging (Washington, DC, March 18-21, 1989).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Competence; *Computer Literacy; Computer Networks; *Computer Oriented Programs; *Gerontology; *Social Scientists; Word Processing

ABSTRACT

This paper shares some ideas regarding the use of computers by persons who use their gerontology training in direct service to older persons and their families. It proposes that, as professionals serving older persons and their families look toward the future, they need to conscientiously incorporate computer competence into their practice. The paper is divided into four parts. First, there is a brief discussion of the concept of computer competence which emphasizes that such competence is really computer fluency. Next, there is an overview of five common computer applications (word processing, electronic spreadsheets, database management, desktop publishing, telecommunications/data communications). Finally, a number of special topics are discussed that can have current and future benefit to applied gerontologists. These topics include hypertext, statistics packages, networking, artificial intelligence, and compact disc read only memory. The paper concludes that the possibilities seem limited only by the knowledge of the hardware and software available and by gerontologists' courage in plunging into this new area of professional practice. (ABL)

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COMPUTER COMPETENCE FOR THE APPLIED GERONTOLOGIST

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Presented at the Annual Meeting of the American Society on Aging, March 20,1989, in Washington, D.C.

Abstract

The computer has become an integral part of communication within the world culture, and as such, it has tremendous utility for the applied gerontologist. As professionals serving older persons and their families look toward the future, they need to conscientiously incorporate computer competence into their practice. This paper presents an overview of the major computer applications (word processing, electronic spreadsheets, database management, desktop publishing, and telecommunications) and discusses how functional ability with each has become a necessary and vital tool for the applied gerontologist. Next, there is a presentation of miscellaneous ideas and additional thoughts on computer applications that would seem to have utility as the profession seeks to better serve older persons and their families.

Introduction

The purpose of this paper is to share some of ideas regarding the use of computers by persons who use their gerontology training in direct service to older persons and their families. This is an exciting area, but as one looks at the literature of the profession as presented in The Gerontologist or Generations, for instance, there is a definite lack of articles on computer applications. The concern of this presentation is with selling the need for applied gerontologists to be able to use a computer as the marvelous tool which it is.

This paper is divided into four parts. First, there is a brief discussion of the concept of computer competence which emphasizes that it is really computer fluency that applied gerontologists should be after as a personal attribute. Next, there is an overview of five common computer applications (word processing, electronic spreadsheets, database management, desktop publishing, and telecommunications/data communications), and finally, a number of special topics are discussed that can have current and future benefit to applied gerontologists.

Computer Competence

The idea of computer competence has been around for a while, and in general it relates to an individual being able to utilize a computer for simple activities. Initially, this meant being able to turn the computer "on" and has carried with it the notion of eliminating a potential user's fear of the electronic revolution. In recent years, the assumption that potential users have grown beyond their fear of, and discomfort with, computers has lead to the hope that a computer might be a "partner" in the learning process as well as in personal productivity. Along with this is Moeller and Hanna's (1987) belief about computer fluency.

> Fluency may be defined as: 1) a propensity to turn to the computer as an educational aid and tool for professional practice, 2) the ability to engage in dialogue with a computer and related technologies in a comfortable manner, 3) a knowledge of the capabilities and limitations of available computational facilities, 4) the ability to develop and use computer programs written in a high-level language and to apply them in the solution of significant problems, and 5) specific knowledge of and experience with numerical methods, modeling, simulation and design, available software packages and their applications, and computer-based instrumentation, data acquisition and processing. (p. 9)

It may not be necessary that applied gerontologists achieve the ability to "develop and use computer programs written in a high-level language" and to have "specific knowledge of and experience in numerical methods, modeling, and simulation and design", but it seems reasonable that trained professionals who are approaching the twenty-first century will be able to 1) use the computer "as an educational aid and tool for professional practice", 2) use the computer and other electronic technology "in a comfortable manner", and 3) have knowledge of what computers can do and how various software packages can be applied to the solution of specific professional problems.

A recent article by Kearsley (1988) discusses basic computer knowledge for professionals. Although the contents of the article do not apply directly to direct service providers in gerontology, the following competencies seem relevant for the profession of applied gerontology. (The author of this paper has substituted the words within the brackets.)

> There are five basic competencies for a computer literate [applied gerontologist]. The include the ability to:

1. describe the possible [applied gerontologist] uses of computers;
2. determine what applications are appropriate for a given [applied gerontologist] situation;
3. select the best software and hardware for a given [applied gerontologist] application;
4. develop successful implementation plans for computer applications; and
5. use computers as a personal productivity tool. (Kearsley, 1988, p. 65)

The task of applied gerontologists is to realize that there is a major revolution happening in the world around us, and it is our responsibility to be a part of it as well as to enable our professional colleagues to be actively involved. According to Jobs (1987) "...people are tool builders" (p. 13), and he goes on to say that he has "...never seen a tool as extraordinary as a computer" (p.13). For him,

> We've got this tool that is the most incredible one that humankind has ever invented and .... we want the next generation of students to grow-up intimately familiar, extremely comfortable and very proficient using these tools. (p. 13)

Computer Applications Overview

Formerly, the computer was an intimidating machine that few people had mastered and even fewer could afford to personally own. Today, "personal computers" (PCs) are common place, and "user friendly" software can enable all who are interested to perform a myriad of personal and professional tasks. In fact, the possibilities are limited only to one's imagination and to their access to equipment. In this section of this paper, five common computer applications are addressed.

Word Processing

Perhaps the most common computer application is word processing. This involves the use of the computer as a typewriter, but the added advantages are the ease with which corrections can be made in documents before final printing of a "hard copy" and with which documents can be stored and retrieved. In the more sophisticated words of Spencer (1986),

> Word processors are computer systems and/or programs that assist in the generation and handling of written text. By allowing for easy, efficient editing and text formatting, word processors increase levels of productivity. Additional capabilities exceed those of the standard typewriter; they include error correction (as quick and simple as backspacing over the incorrect characters), saving paper, and avoidance of erasures. (p. 133)

With increased sophistication, word processing can incorporate software that checks spelling and grammar as well as that which provides a thesaurus for the writer. Sumner (1988) states that

> Word processing packages may be the most common application software in use today. The reasons word processing is so popular are simple: Word processing saves work. Word processing saves time. Word processing saves money. (p.167)

> Where once a business had three workers using three typewriters, today a microcomputer and a word processing package lets one person do the work of three to produce documents faster. The specific advantages of word processing are: Easy correction of errors; availability of varied formats; and automatic or shortcut performance of many tasks, such as moving, deleting, copying, searching, and replacing. (p. 167)

For the applied gerontologist, the possible applications of word processing are many. Papers, grant proposals, articles,

correspondence, handouts, text files for desktop publishing and electronic bulletin boards, cumulative notes on clients, transcriptions of interviews, client charts, academic assignments, theses, dissertations, and charts and templates can be created with basic word processing knowledge.

Electronic Spreadsheets

Electronic spreadsheets are a novel computer application. They grew out of the business world and are essentially hundreds of columns with hundreds of rows, much like a ledger sheet. Spencer (1986) states that

> No other program, or category of programs, has helped define the microcomputer revolution more than the electronic spreadsheet. Powerful, and yet relatively easy to use, the computer is inexpensive, and the program requires the user only to point with the cursor to a cell on a matrix of rows and columns and type in the require information. (p.146)

Further,

> An electronic spreadsheet transforms the computer screen into a huge ledger sheet. By simulating the rows and columns of a ledger, the spreadsheet permits a user to work with a large series of interrelated values. The program will relate any row/column coordinate to any others. When a user changes a given value, the program automatically recalculates any other affected values in seconds. Without such a program, these recalculations could take hours, and the results might still contain an error some place. Not only can the spreadsheet job be performed that much more quickly and accurately, it also encourages more assumptions to be assessed. (Spencer, 1986, p. 146)

Sumner (1988) stresses the idea of the assumption-testing advantage of the speadsheet, because

> A spreadsheet can be used in any situation where the user would otherwise use a pencil, paper, and a calculator -- in other words, any situation that can be described numerically. A spreadsheet that has been set up for use in a specific situation is called a model. Spreadsheet models combine fixed and changeable components. (p. 187)

> A spreadsheet lets the user structure the model so that when the variables change, the work does not have to be redone. The headings and calculations will take care of reworking the model with the present data and producing the results of the new calculations instantly. Merely by changing these variables, the structure can be used over and over again. (p.187)

For Heid (1988),

> A spreadsheet lets you explore different approaches to a problem -- without the risk. And because life is full of problems and risks, spreadsheets have 1001 uses. (p.201)

For the applied gerontologist, there are numerous applications for electronic spreadsheets. Financial data and any material that is quantified is easily handled and analyzed using spreadsheets. Here, there is an emphasis on accounting and the analysis of cost and performance. In addition, data on service to clientele, demographics on clients, and evaluation data are appropriate fodder for this computer application.

> The secret of a spreadsheet's organizational virtues is its gridlike approach to storing information. A blank spreadsheet is divided into horizontal and vertical lines that create a grid of boxes called cells. (Heid, 1988, p.201)

Heid (1988) goes on to describe a unique function of a common spreadsheet when he states

> Spreadsheets' abilities to neatly pigeonhole text and numbers make them good database manages. When using a spreadsheet for data management, label columns with your field names (such as Name, Address, Phone) and build down from there, making each row a record. There's no need to fuss with field definitions and maximum character lengths: every cell will accept any combination of text or numbers, and most spreadsheets can hold 255 characters per cell. And you can use the spreadsheet's library of functions and math features to analyze data and create reports. (p.204)

Database Management

The amount of data available today really defies the imagination. There is qualitative information such as books, reports, and articles, and there are data that are quantified, such as phone numbers, ages, incomes, Social Security numbers, case numbers, call numbers, DSM III numbers, etc. In either case, the management of this data in an orderly manner would be very difficult without computers. According to Spencer (1986),

> The organization, storage, and management of vast amounts of information create ... problems.....The problem of maintaining large amounts of information in a central storage location is not perplexing; however, locating and extracting specific pieces of information from that huge storehouse often is. This situation is further complicated when several specific bits of information are needed simultaneously and their relationships to one another are explored. (p. 151-152)

It is Tittel's (1988) opinion that

> One of the most useful pieces of software for keeping track of data is called a database management system (DBMS), and separate collections of data managed by such a program are called databases. (p. 45)

And, Spencer (1986) states that

> The easiest way to understand the concept of a database and of database management is to visualize a large general filing department. Within the filing department, information is contained in groups of filing cabinets and organized by subjects such as history, math, science, art, and so on. The collection contains letters, documents, periodicals, illustrations, and all other forms of documentation relating to the subjects. Each collection is housed in files that have several drawers holding file folders. The file folders contain the documentation or, in some cases, references to where the documentation can be found. Extensive directories enable a user to gain access to required information. Each user of the department may have different requirements for the information, but the collections provide all the current and historical information needed. (p. 152)

> A computer database management system provides a data structure where information can be stored and accessed for many applications. (Spencer, 1986, p.152)

Sumner (1988) defines a database

> ...as a collection of related data items that are stored together for use in multiple applications. This means that the data need to be physically stored only once in the computer system. The individual data items are related in a logical way and can be accessed by different applications programs, as needed. (p. 238)

There are three distinct types of database management systems, hierarchical, network, and relational, and these are categorized based upon how records within the system are composed and related to each other. Tittel (1988) describes each system:

> Hierarchical, where record structures work in much the same way as the Mac's hierarchical file system (i.e., a tree structure where a file or folder can have only one parent, but many children). This type of database is often called a flatfile database, since it can be represented by a collection of fairly simple data files. (pp. 46-47)
>
> Network, where record structures can be arbitrarily linked, but all links must be designed ahead of time. (It is true that many-to-many relationships in this type of DBMS must be modeled through intermediate link records.) This type of database often relies on link records and special indexes and is not commonly found on microcomputers. (p.47)
>
> Relational, where record structures can be declared ahead of time or composed on the fly, and items can be related to one another simply by sharing a common bit of information between them. Relational databases use table structures to conceptualize and display records (each record occupies a row in a table, where the columns represent fields belonging to all records in the table). (p. 47)

Going further, Tittel (1988) states that

> Each of these kinds of databases has its champions and is well-suited to a particular type of use: hierarchical for simple, relatively static data models; networks for simple or complex data models with large amounts of data and multiple inter-relations that change seldom or not at all; and relational, where small- to medium-sized collections of data are very fluid and

> where relationships and even entities cannot all be designed in ahead of time. (p. 47)

For the practicing applied gerontologist, there are numerous applications of a database management system. As the preceding paragraphs illustrate, this system can make the storage and retrieval of information much easier. Bibliographic, clientele, job, referral databases are common both on and off the university campus. In addition, specialized databases may contain information on medications, nursing homes, nutritional information, Federal program guidelines, AAA services, potential granting agencies, Medicare or Medicaid regulations, physicians and their specialties, the US Census information, articles from Generations, The Gerontologist, etc., and specific publications on social support, computer applications for the applied gerontologist, etc. Having a database management system working for you will enable the cataloguing of what has been read as well as the accessing of specific material by author, title, subject, journal, date, location, keyword(s), etc.

Desktop Publishing

One of the most exciting and useful applications of computer technology is the recent advent of desktop publishing. In years past, professional typesetting was required for the preparation of a respectable brochure, newsletter, or newspaper, not to mention the publication of a textbook or monograph.

> Today, with the use of PC-based software, users can create, edit, make up page layouts for, and produce high-quality printed documents. Applications include calendars, brochures, letterheads, invitations, invoices, newsletters, and financial reports. (Sumner, 1988, p. 227)

At Creighton University, two anecdotes illustrate this power. First, the Fine and Performing Arts Department had been averaging $2000 per

year for typesetting services for programs, brochures, etc., before they purchased a Macintosh computer and a desktop publishing program called Pagemaker. After a full year doing layouts with the Mac and Pagemaker, there total typesetting cost was $100. And, second, this fall, our Department of Journalism and Mass Communication opened a writing laboratory with twenty-five Macintosh computers, and the week after school opened, the students began laying out the weekly student newspaper on the computer, rather than using the old, cut-and-paste method.

Desktop publishing has numerous applications for the applied gerontologist. Sumner (1988) states that

> Desktop publishing requires that the skills of writing, editing, and page layout be combined with the knowledge of running computer applications. (p.228)

But, elementary levels of these skills can be picked up fairly easily when there is the motivation and a willing teacher readily available. With only experience on an Apple IIe, the senior author sat down at a Macintosh for four hours and was able to create the first issue of the Association for Adult Development and Aging Newsletter in the fall of 1987. Now, the entire newsletter is composed and composed at his desk, and after that is completed, he goes to the laser printer on campus to print out a copy which is taken directly to the campus print shop. The savings to AADA are sizable, and the professional appearance is a fair step above what one would get from a typewriter and a cut-and-paste layout.

Applied gerontologists are encouraged to develop pamphlets, brochures, newsletters, etc., in order to facilitate communication and learning among their clientele.

Telecommunication/Data Communication

By far the most exciting utilization of computer technology is in the area of telecommunication or data communication.

> Data communications is the transfer of encoded information from one location to another by means of a communications channel. It involves three basic elements: (1) a sending unit (the source), (2) a transmission channel (the medium), and (3) a receiving unit (the destination, sometimes called a "sink"). The sending and receiving units are usually computers or terminals. The transmission channel is commonly a telephone line, though data can also be transmitted in the form of radio waves, microwaves, or laser beams. (Sumner, 1988, p. 272)

By using a personal computer, an individual can sent and receive encoded information. This information is encoded via a modem which is

> A device used at each end of a telephone line to convert binary digital data to audio tones suitable for transmission over the line and vice versa. (Spencer, 1986, p. 336)

The modem is the individual's link to an incredible reservoir of information, and although the telephone line is the most frequently, satellites and up- and down- links will someday be the most often used channels.

The bywords of telecommunication and data communication for practical application are "accessing" and "sharing". The user of the personal computer and a modem can **access** a vast number of bibliographic databases for research purposes. In addition, there are a growing number of electronic bulletin boards systems (BBS) that enable the **sharing** of information such as reports, bibliographies, software and shareware, questions and answers. These bulletin boards allow data and text transfer.

Grundner and Garrett (1986) provide a wonderful description of an existing electronic bulletin board that operates out of the Department of Family Medicine at Case Western Reserve University. This BBS is known as an electronic hospital and known as "St. Silicon's Hospital and Information Dispensary".

> ...a castoff microcomputer was connected to a phone line, and a computerized "bulletin board" system was set up, complete with electronic mail, a general notice and announcement area, and other features. Any faculty or staff member with access to a microcomputer or a computer terminal with a modem could use the system to receive and send messages 24 hour a day. (p. 982)
>
> Faculty from the department (all board-certified family physicians) were recruited to monitor the system and answer whatever questions came in. They were instructed to do no diagnosing or treating, but to feel free to give general information on any topics that should arise, much as they would in their own offices. They were asked, however, to try to respond to any question within 24 hours of its posting. (p. 982)
>
> In view of the initial spontaneous but unauthorized use of the system to gain medical information, we wanted to see what would happen if people had unhindered, free, computerized access to a physician and were made welcome to ask any question they wanted. The results exceeded our wildest expectations. (p. 982)
>
> In the second week after installation of the new system, we received over 100 calls per week. A month later we were averaging between 150 and 200 calls, and for the past four months we have been averaging 233 calls per week on a system with a single phone line. (pp. 982-983)

> About a third of those callers were medical professionals wanting to use various other features of the system. The rest, however, were members of the public, who have asked over 500 medical and 100 dental questions through the system in just over one year of operation, with new questions currently arriving at the rate of about 20 per week. (p. 983)

Telecommunication allows applied gerontologists, who have a personal computer and modem, to literally access the world's information. The collections of world's libraries, the vast bibliographic and demographic databases are within reach, and thanks to the computer, these collections can be searched, desired material located, and that material exported to the searcher's PC in a matter of moments. If the actual material is not a part of the electronic media, it can quickly be made so using a fax machine or an electronic digitizer.

There are a number of gerontologically-oriented databases which should be of interest to the applied gerontologist. For example, **Ageline** is a database devoted to citations on middle age and aging and is produced by the American Association of Retired Persons. In addition, **CompuServe** and **Dialog** are national computer databases with sub-databases that contain gerontological information that can be accessed for practical applications. Finally, it must be pointed out that telecommunication can be used to tap into the vast resources of newer forms of database systems. As Gerson (1987) points out,

> In the future, as college libraries place their catelogs on-line, most [professionals] will do much of their bibliographic work from a micro-computer or terminal at their desks. Much of the technology t to this is available now. Each year, larger and larger amounts of information are available electronically. Virtually every major bibliographic database is now available, as well as newspaper, text, economic data, the census, and even many humanities sources. Listings of on-line sources are as thick as telephone directories. (p. 139)

Miscellaneous Applications and Thoughts

The computerization of the applied gerontologist is far beyond the scope of this paper, but there are a few other areas that need to be mentioned, for they have exciting potential for the profession. The following five topics (application areas) are creating vast new possibilities for service to older persons and their families, and these are hypertext, statistics packages, networking, artificial intelligence, and CD-ROM.

Hypertext

With the advent of Apple's **Hypercard**, the concept of hypertext has become a popular reality.

> Hypertext is a term coined by Ted Nelson in the mid-1960s to describe the process of creating, storing and retrieving ideas and information in a non-linear structure. (Fraase, 1988, p. 70)

This non-linear structure is, in fact, how most of us think, for we typically trail off on tangents. We are superficial as we explain some issues and plunge into deeper and deeper levels when we get excited about pet topics.

The power of a hypertext operation is illustrated by Wesley (1988) as he describes a software product called **Guide**. The potential seems self-evident.

> The professor was reading a paper on psychophysiology that had been turned in that morning. She had already been impressed

by several of the students in her freshman class, but she could hardly believe the quality of the work in front of her. (p. 127)

It had taken her a long time to recognize the potential of a personal computer in the hands of a bright student. But since the school had standardized on Macintosh a few years before, there had been a noticeable rise in the quality of thinking and the level of understanding displayed by her students. And once she'd decided to allow her students to use Guide to write and turn in their papers electronically. instead of in printed form, the quality of their finished work had improved as well. (p. 127)

She paused a moment to reflect on the irony of a "paper" that would never reach printed form. Perhaps they would have to coin a new term for the electronic documents that were now taking the place of typewritten or even word-processed reports. Or perhaps not. The irony was rather amusing, she thought, as she moused on to the next section of the paper, a discussion of endorphine production. (p. 127)

The student had made excellent use of the abilities of hypertext. Where words were used that required a definition, the student had created a note. The professor, or any reader for that matter, could click on the uncertain word and the definition appeared briefly in a small window on top of the text. The professor quickly checked the definition of "endorphin", then continued. (pp. 127-128)

In the next paragraph the student quoted a study done at the University of Denver and footnoted it. Instead of having to scan the footnotes section for the correct citation, the professor clicked on the reference in the text. Instantly, the citation appeared in place of the quotation, and as quickly went away when the professor clicked on the "footnote". Again, the professor chuckled at the anachronistic terminology. (p. 128)

A bit further on, the student referred back to a diagram that had been used to clarify a point in an earlier section of the paper. Instead of having to search for the diagram, the professor clicked on the reference. Guide located the chart and moved the display to the appropriate page. When the professor was ready to go on with the text, she clicked on the chevron in the scroll bar and returned to the precise location of the reference. This was so much easier than flipping through page after page, she thought. (p. 128)

When she finished the paper, the professor made a few short notes at the end, then sent it back to the student via electronic mail. Along with her comments, and a grade of A, the professor sent along a suggestion that the student submit the paper to Psychophysiology Now, the first and most respected of the electronic journals that had appeared in recent years. The professor sighed with satisfaction and called it an evening. (p. 128)

Hypertext and applied gerontology seem to be well-suited for each other. Papers could be developed that incorporated many levels of thought and information as was the case in the above example. A paper could describe Medicare and have "buried" within it graphs, bibliographies, suggested strategies, criteria, etc., that actually supplement the content of the paper, but they do not have to be consulted unless desired by the reader. Applied gerontologists could develop extensive training packages to acquaint new practitioners with the procedures and literature of the profession. Perhaps, programmed learning packages could be developed wherein explicit answers, or procedures for arriving at answers, are buried behind the "buttons".

Statistics Packages

The personal computer has brought to everyone the capability of performing statistical operations on very large collections of data. Formerly, mainframes were required to conduct the operations that are now possible on a PC. There are available software packages that enable the user to develop SPSS files and to perform tests on those files. These packages have great utility within applied gerontology, and each professional should be able to use them.

Networking

Networks, and local area networks (LANs), are the connecting of computers into a system that typically has a central serving unit with a hard disk from which the other computers in the system draw software and files. Members of a network may be in the adjoining office, the next building, across town, in another state or in another country. These computers are capable of communicating with each other and therefore sharing with each other. Members of the network can work together on the same project, share software and data files, leave messages for each other, etc. McCarthy (1988) describes the configuration as follows:

> First, all LANs can be classified as one of two kinds: (a) the hard-disk LAN and (b) the terminal/system network, or point-to-point LAN. A hard-disk LAN has three basic components: a file server, which is the computer that runs the network and stores the network files; cables, which link system workstations (PCs or Apples, for example) to the file server and; system software, which allows for data transfer between file and workstations and for accessing peripherals. The hard-disk LAN is typical of .... computer lab installations. Instructional or applications software is downloaded to student workstations; student work files are stored on the file server and can be accessed by the instructor. (p. 25)

> The terminal/system, or point-to-point LAN, provides the same functions as a hard-disk LAN, but also allows each workstation on the network to serve as a system node; that is, each workstation can both receive and send data to any other workstation. A terminal/system network often links microcomputers to larger computer environments, whose power they can access, and to remote-site databases. (p. 25)

Imagine a local area network of applied gerontologists who can share software and client information with each other. Likewise, imagine a network that clients can access and which contains electronic mail capabilities and databases related to services and programs within the service area. Now, dream a bit, and imagine all applied gerontologists and service professionals linked together via a national network.

Artificial Intelligence

As the power of computers has developed in the last twenty years, the concept of artificial intelligence has also evolved. Sumner (1988) states

> Artificial intelligence refers to the development of computer-based systems that simulate human performance. In other words, a computer system that has some capacity to "analyze" a situation and "act" on the basis of that analysis is "behaving" in a human-like way. (p. 475)

> The development of decision support systems enables managers to use computer-based information systems as a tool to support their decisions on a day-to-day basis. The tools for decision support are user-friendly microcomputer-based data base and mainframe-based forth generation languages that can be learned by people who are not computer professionals. As such, decision

> support systems have integrated the computer into the working habits of many managers and professionals. (p. 488)
>
> Artificial intelligence has brought humans and machines even closer together. Now, computers can capture the knowledge of experts and make it possible for hundreds of doctors, lawyers, science professionals, and business persons to benefit form this expertise. (p. 489)

The application of expert systems to applied gerontology is speculative at this point because of the state of the profession. Conceivably, artificial intelligence could be applied to the in-service training as we work to develop proficiency with service skills, for an AI system could be developed to give immediate feedback on the quality of service responses. In addition, AI could be used to make diagnoses of clients based upon their scores on various assessment tools and/or to suggest theory-based treatment for clients. This is much like similar systems in use that help physicians make diagnoses and prescribe treatment (Spencer, 1986, pp. 261-262).

CD-ROM

A relatively recent development on the computer scene has been the CD-ROM (compact disk read only memory).

> A CD-ROM disk, which looks like a compact disk for sound reproduction, can store up to 550 megabytes of data, which is equivalent to 1200 floppy disks or about 150,000 printed pages. CD-ROM disks are read in hardware units that can be attached to computers.... (Sumner, 1988, p.113)
>
> CD-ROM is well suited to the storage of large data bases, catalogues, directories, parts lists, newspaper files, and the like. Currently, many on-line data bases....are available to users via on-line access with by-the-minute or -hour costs for connect time.

> As any private user of an on-line data base knows, connect time adds up quickly. Instead, users can purchase entire data bases on a CD-ROM disk and use a CD-ROM player to access these data. (Sumner, 1988, pp. 113-114)

> CD-ROM will not necessarily replace large on-line data bases. Rather, this technology will enable users to buy certain data bases for personal or in-house use, similar to maintaining a personal or in-house library. (Sumner, 1988, p. 114)

The research utilization of CD-ROM-based material is limitless, but it has not yet reached the applied gerontologist. The time is now when bibliographic data bases, census data, drug information, assessment items, discharge-planning objectives, etc. are available on CD-ROM, and they are accessible.

Conclusion

The possibilities seem limited only by our knowledge of the hardware and software that is available and by our courage in plunging into this new area of professional practice. The intent of this paper was to provide some challenging new ideas for use by applied gerontologists as they work to develop computer fluency as a means of ultimately better serving older persons and their families.

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